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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,818	01/23/2004	Ferruccio Frisina	2110-83-3	5006
996	7590	10/17/2005	EXAMINER	
GRAYBEAL, JACKSON, HALEY LLP			CAO, PHAT X	
155 - 108TH AVENUE NE			ART UNIT	
SUITE 350			PAPER NUMBER	
BELLEVUE, WA 98004-5901			2814	

DATE MAILED: 10/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/763,818	FRISINA ET AL.	
	Examiner	Art Unit	
	Phat X. Cao	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 8-12 and 21-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6, 7, 13-16, 19 and 20 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 17 and 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>1/23/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's election with traverse of Group I (claims 1-7 and 13-20) in the reply filed on 7/28/05 is acknowledged. The traversal is on the ground(s) that "the Examiner can search and examine the entire application without serious burden". This is not found persuasive because Applicant has not provided any reasons to support that the alternative methods proposed by the examiner are not distinct from the methods as claimed. Moreover, the search is not coextensive as evidenced by different search for different classification. Therefore, the search and examination of the entire application would place a serious burden on the examiner.

The requirement is still deemed proper and is therefore made FINAL.

Drawings

2. Figures 1, 1a, 1b, 2 and 3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 1,13 and 19 are objected to because of the following informalities:

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- in claim 1, line 24, a phrase "in that said dielectric region" needs to be changed to "wherein said dielectric region";
- in claim 1, line 27, a phrase "and in that said metal region" needs to be changed to "and wherein said metal region";
- in claim 13, line 3, and claim 19, line 3, a phrase "a two gate regions" needs to be changed to "two gate regions".

Appropriate correction is required.

4. Claims 13, 15 and 19 are objected to because of the following informalities:

It appears that "at least one source contact region" (claim 13, line 15) and "a source contact region" (claim 13, line 19) are two different elements. Therefore:

- in claim 13, line 19, an element "a source contact region" needs to be changed to "a conductive region" in order to distinguish "a conductive region" from "at least one source contact region" recited in line 15;
- similarly, in claim 15, line 1, an element "the source contact region" needs to be changed to "the conductive region";
- and in claim 19, line 21, an element "a source contact region" needs to be changed to "a conductive region".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 13-16 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Farrenkopf (US. 5,854,099).

Regarding claims 13, 15 and 19, Farrenkopf (Figs. 3J-3N) discloses a MOS power device using in an electronic system (column 1, lines 54-56), MOS power device including a body structure 202/204 forming a drain region of the device, a body region 220 formed in the body structure 202/204, a source region 226 formed in the body region 220, and two gate regions 230 each formed adjacent and insulated from the body region 220, the device comprising: at least one body contact region P+ formed in the source region 226 (see Fig. 3M and column 4, lines 19-22) and extending through the source region 226 to the body region 220, each body contact region P+ having a first conductivity type and the body region 220 having the first conductivity type (P type), and each body contact region P+ being more heavily doped than the body region 220 of P type; at least one source contact region 234 (see Fig. 3M) formed in the source region 226, each source contact region 234 having a second conductivity type (N type) and the source region 226 having the second conductivity type (N type), and each source contact region 234 of N+ type being more heavily doped than the source region 226 of N type; and a metal contact M1 (column 4, lines 26-28) formed on the body and source contact regions.

Regarding claims 14 and 16, Farrenkopf's Fig. 3a further discloses that: the body structure 202/204 comprises a semiconductor substrate 202 having the second

conductivity N+ type and an epitaxial layer 204 formed on a surface of the substrate 202, the epitaxial layer 204 having the second conductivity N type and being more lightly doped than the substrate 202 of N+ type and the body region 220 being formed in the epitaxial layer 204; and the body region 220 and the source region 226 have a strip-like shape and have a longitudinal axes.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-3, 6 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farrenkopf as applied to claim 19 above, and further in view of Kwon (US. 2002/0195654).

Regarding claims 1-3, Farrenkopf (Figs. 3J-3N) discloses a MOS power device, comprising: a body 204 of semiconductor material having a first conductivity N type and a surface; at least two gate regions 230, of semiconductor material, arranged on top of the surface of the body 204 and insulated from the body 204 by gate-insulation regions (not labeled, see column 3, lines 62-63), the gate regions 230 being arranged at a distance from one another and delimiting between them a window having a given width; a body region 220 housed in the body 204, underneath the window, the body region 220 having a second conductivity P type and a first doping level; a conductive region 226, accommodated in the body region 220 and facing the surface, the conductive region

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226 having the first conductivity N type and a second doping level; a dielectric region D1 covering the gate regions 230 (Fig. 3N); and a metal region M1 extending on top of the dielectric region D1 and being in electrical contact with the body and conductive regions; characterized by: first contact regions P+ (Fig. 3M), distinct from the body region 220, extending from the surface through the conductive region 226 as far as the body region 220 (see column 4, lines 19-22); and second contact regions 234, extending in the conductive region 226 and having the first conductivity N type and a third doping N+ level greater than the second doping N level, the second contact regions 234 extending at the side of the first contact regions P+; wherein the dielectric region D1 further extends on top of the conductive region 226, at least piece-wise, throughout the width of the window and has an opening on top of the first and second contact regions, and wherein the metal region M1 extends through the opening and is in direct electrical contact with the first and second contact regions.

Farrenkopf does not disclose that the metal region M1 in contact with the first and second contact regions through the first and second openings formed in the dielectric region D1.

However, Kwon (Fig. 9) teaches a MOS power device having a metal region 62 in contact with the first contact region 58 and the second contact regions 52 through the first and second openings formed in the dielectric region 60. Accordingly, it would have been obvious to modify the device structure of Farrenkopf by forming the metal contact region M1 in contact with the first and second contact regions through the first and second openings formed in the dielectric layer D1 because such forming of a structure

of the metal contact region would reduced pinch resistance of a body region, as taught by Kwon (par. [0018]).

Regarding claim 6, Farrenkopf's Fig. 3N further discloses that the first contact regions P+ have the second conductivity type and P+ doping level greater than the P doping level of the body region.

Regarding claim 20, Kwon also teaches that the MOS power device is widely used in many applications such as drive circuit or switching mode power supplies (par. [0005]). Accordingly, it would have been obvious to apply the MOS power device of Farrenkopf in a computer system because the MOS power device can be used as drive circuits or switching circuits in the computer application.

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Farrenkopf in view of John (WO. 99/33119- cited in IDS).

Farrenkopf does not disclose that the first contact regions M1 are formed in the cavities underneath the first openings.

However, John teaches a MOS power device having the contact regions 34 contacting to the source/body regions and formed either in the cavities underneath the openings (Fig. 3A) or without the cavities underneath the openings (Fig. 5A).

Accordingly, it would have been obvious to modify the device of Farrenkopf by forming the first contact regions M1 either in the cavities underneath the openings or without the cavities underneath the openings because either of the arrangements would provide the same results of electrical connections to both body region and the source region, as taught by John (page 7, lines 27-31).

Allowable Subject Matter

10. Claims 4-5 and 17-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record fails to disclose the source and body contact regions have a strip-like shape and the source and body contact regions are alternately formed along the strip, as recited in claims 4 and 17-18.

The prior art of record also fails to disclose the first contact regions being aligned with the further second contact regions and the second contact regions being aligned the further first contact regions in a second direction perpendicular to the first direction, as recited in claim 5.

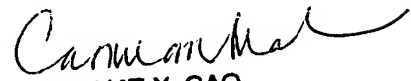
11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is 571-272-1703. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PC
October 13, 2005


PHAT X. CAO
PRIMARY EXAMINER